STORMWATER FACILITIES
OPERATION & MAINTENANCE MANUAL
for
MORNINGSIDE HEIGHTS 7TH ADDITION

October 2007

TAYLOR ENGINEERING, INC.
106 W. Mission Avenue
Spokane, WA 99201
(509) 328-3371
STORMWATER FACILITIES
OPERATION & MAINTENANCE MANUAL
For
MORNINGSIDE HEIGHTS 7TH ADDITION

Date: October 19, 2007
Prepared By: Mark A. Aronson, P.E.
Ben Nielsen, E.I.T.

TAYLOR ENGINEERING, INC.
106 W. Mission Avenue
Spokane, WA 99201-2322
(509) 328-3371
tei@tayloengr.com
# TABLE OF CONTENTS

I. Purpose ........................................................................................................................................... Page 2

II. Description ..................................................................................................................................... Page 2

A. Catch Basin, Manholes and Conveyance Pipes ................................................................. Page 2
B. Treatment and Detention Pond with Drywells ............................................................... Page 2

III. Function .......................................................................................................................................... Page 3

A. Catch Basin, Conveyance Pipes and Manholes .......................................................... Page 3
B. Treatment and Detention Pond with Drywells ........................................................ Page 3

IV. Responsibility to Maintain ........................................................................................................ Page 3

V. Maintenance ................................................................................................................................ Page 4

A. General ........................................................................................................................................... Page 4
B. Catch Basins, Manholes, and Drywells ........................................................................ Page 4
C. Treatment and Detention Pond ......................................................................................... Page 4
D. High Density Polyethylene Pipe (HDPE) ........................................................................ Page 5

VI. Summary ...................................................................................................................................... Page 5
STORMWATER FACILITIES
OPERATION AND MAINTENANCE MANUAL
for
MORNINGSIDE HEIGHTS 7TH ADDITION

I. Purpose

This Operation and Maintenance Manual is intended to provide general guidelines for maintaining the stormwater facilities built in conjunction with Morningside Heights 7th Addition and to also serve three (3) lots in existing Morningside Heights 5th Addition. The proper operation and maintenance of these facilities will be the responsibility of the Morningside Heights 7th Addition Home Owners Association. Implementation of these guidelines should help to insure that these facilities will continue to operate in the manner in which they were designed as defined by the final approved plans of record on file at the Spokane County Division of Engineering and Roads.

The proper operation and maintenance of the stormwater facilities shall include insuring that the stormwater facilities are maintained in such a manner that the established construction specifications, approved plan configuration and design performance standards are maintained at a level that is at least equal to that which the design engineer approved for this project.

II. Description

The stormwater facilities installed for this project consist of one primary system, which is comprised of a series of catch basins, storm manholes, and conveyance pipes that outlet to two treatment ponds connected by an overflow structure. Stormwater disposal occurs using drywells placed in the bottom of the lowest pond.

A. Catch Basin, Manholes and Conveyance Pipes

This system provides a series of catch basins located at low points and on grade to collect the stormwater runoff generated from Daystar Road, Apollo Road, Chapman Road, and emergency overflow from Morningside Heights 5th Addition stormwater facilities. Once the stormwater is collected by catch basins it is transported through the piping system, which consists of a combination of 10”, 12”, 15”, 18”, and 24” HDPE pipe. Stormwater is transported by this system to an outlet at the treatment and detention ponds, where it receives treatment and ultimately is disposed of through one of five (5) Spokane County Standard Type B drywells.

B. Treatment and Detention Ponds with Drywells

Treatment of the stormwater is required in accordance with the Spokane County Aquifer Sensitive Area Ordinance. All driveable surfaces that generate stormwater
runoff must be treated. Treatment ponds are grass lined in soils that allow for percolation. Stormwater is treated by sedimentation (settling of suspended soils), biological processes in the underlying soils and grass vegetation, and soil filtration. The treatment ponds are also utilized for detention, which provide storage of stormwater during storm events prior to disposal. Design methodology for ponds was based on minimizing the land area needed to store runoff volumes.

III. Function

The stormwater facilities for Morningside Heights 7th Addition and three (3) lots from Morningside Heights 5th Addition are generally very simple and should operate with very little attention. In most instances, a non-functioning system will be visually obvious and regular maintenance of the system will eliminate the occurrence of drainage problems. The following describes each component of the stormwater systems and the proper function of that component.

A. Catch Basin, Conveyance Pipes, Rip Rap Pads, and Manholes

Catch basins provide collection of runoff from the road areas. The conveyance pipes are provided to route the runoff to the treatment and detention facilities. Rip rap outlet pads are placed at all outlet pipes from the conveyance system in order to protect the pond bottoms from erosion. Manholes are provided at all angle points in the piping system to allow for cleaning and prevent blockages.

B. Treatment and Detention Ponds with Drywells or Outlet Structures

Treatment and detention ponds accept runoff from the conveyance pipes for treatment in accordance with the Aquifer Sensitive Area Ordinance and provide storage for the stormwater runoff. Drywell and overflow structures are placed with rim elevations 0.5' above the pond bottom. This allows stormwater generated during a storm event to be treated prior to disposal through the drywells. Each pond has one rip rap pad outlet structures to provide erosion control. These structures are placed at all pipes discharging to the ponds. Normal operation of the ponds will include some ponding.

IV. Responsibility to Maintain

Morningside Heights 7th Addition Home Owners Association will be responsible for the proper operation and maintenance of the stormwater facilities described in this manual. Those systems include catch basins, conveyance pipes, treatment and detention ponds, and drywells. Morningside Heights 7th Addition Home Owners Association shall follow the methods described in this manual.
V. Maintenance

The following information provides a maintenance description for each of the stormwater elements included in this project. Morningside Heights 7th Addition Home Owners Association is responsible to provide the maintenance described on the schedule noted within each element.

A. General

The following stormwater facilities shall be visually inspected following a significant rainfall or snowmelt event.

1. Inspect all catch basins, pipe inlets, drywells, pond overflow, and outlet structures making sure that they are clear of debris and obstructions.

B. Catch Basins, Manholes, and Drywells

The catch basins, manholes, and drywells should have the grates removed at least twice a year, once in the spring (April) and once in the fall (October) to insure that they are free from dirt, silt, and debris and operating properly. Should excessive silt, dirt, or debris be discovered in any catch basin, manhole, or drywell, it must be cleaned out by means of a vactor truck.

C. Treatment and Detention Ponds

Periodic maintenance of the ponds should be done to insure it is functioning properly. The following items should be noted:

1. The rip rap pads, located at pipe outlets, should be secure in the areas defined by the plans and should be free from debris. The edges of the rip rap pads should be checked for scouring of the dirt around the pad. Any scouring or gouging of the dirt needs to be repaired and sodded or seeded to insure proper vegetative growth and soil stabilization.

2. The bottom of the pond needs to be free from debris and sediment deposition.

3. The treatment and detention pond shall be seeded with the following dryland seed mix:

   30% Covar Sheep Fescue
   30% Durar Hard Fescue
20% Canada Bluegrass
20% Creeping Red Fescue

Provide mixture composed of grass seed and fertilizer in percentages as follows:

Grass Seed: 50-60 lbs. per acre
Fertilizer: 16-16-16 timed release Composition, 300 lbs. per acre.

D. High Density Polyethylene Pipe (HDPE)

The HDPE pipes should be checked periodically for obstructions at each end and twice a year the pipe should be visually inspected to insure that there is not mid-pipe blockage. Should a mid-pipe blockage be observed, it should be removed immediately. In the event that any of the pipes were to fail by being crushed, they must be replaced with the same type and size pipe as soon as the failure is discovered.

VI. Summary

By understanding the stormwater system as described herein and properly maintaining the components, the homeowners of Morningside Heights 7th Addition will have a long lasting and effective stormwater facility.
Taylor Engineering, Inc.
W. 106 Mission Ave., Suite 206
Spokane, Washington 99201

prepared by: BAN
date: 10/22/2007

MORNINGSIDE HEIGHTS 7TH ADDITION
OPERATIONS AND MAINTENANCE
COST PER LOT PER YEAR

ANNUAL OPERATION AND MAINTENANCE COSTS

(O&M) $2,684

PRESENT VALUE OF DRAINAGE SYSTEM
50% REPLACEMENT VALUE OVER 20 YEARS
(PV) $80,626
(PV-50%) $40,313

ASSUME 4% INFLATION (FROM ATTACHED TABLE)
FUTURE VALUE OF SYSTEM TO REPLACE IN 20 YEARS
(F/P) 2.1911
(FV) $88,330

ASSUME 6% INVESTMENT (FROM ATTACHED TABLE)
ANNUAL SET ASIDE FOR FUTURE REPLACEMENT
(A/F) 0.0272
(A) $2,403

TOTAL ANNUAL COST (O&M)+(A)
(TAC) $5,087

SYSTEM VALUE

Catch Basins - WSDOT2 (EA)
SPCC01 (EA)
Manholes I-48 (EA)
I-60 (EA)
Drywells Dtl Depth (EA)
Pipes: 6" (L.F.)
10" (L.F.)
12" (L.F.)
15" (L.F.)
18" (L.F.)
21" (L.F.)
24" (L.F.)
30" (L.F.)
Misc Structures
(flow control WIER) (EA)
(flow control RPRAP) (EA)

ANNUAL COST PER LOT (TAC)/#LOTS
(MORNINGSIDE HEIGHTS 7TH + MSH 5 (3 Lots))
21 $242.22

ANNUAL COST PER LOT (TAC)/#LOTS
(MORNINGSIDE HEIGHTS 7TH + 5TH FUTURE VISTAS AT MORNINGSIDE HEIGHTS LOTS)
26 $195.64

$80,626.00